

P a t e n t c l a i m s

1.

A multifunctional switch device having a function for rotation and also tilt and/or press functions, intended for use in electronic equipment such as computers, handheld electronic apparatus and/or devices associated with use in means of transport such as vehicles, boats and aircraft, said equipment having or being connected to a display for function control, characterised in

- that the switch device has a central tilting device consisting of a housing which surrounds two mutually movable, cardan coupling-supported parts, wherein a first of the parts is mounted to the housing at a first pair of supporting points, and wherein a second of the parts is supported on the first part at a second pair of supporting points which are offset 90° relative to the first pair. (Figs. 1-2)

2.

A multifunctional switch device as disclosed in claim 1, characterised in

- that the housing of the tilting device and said first part and said second part are fixedly attached to each other; and
- that the supporting points are flexible and torsional for mutual cardan movement.

3.

A multifunctional switch device as disclosed in claim 1 or 2, characterised in

- that the second part of the tilting device has arms in a cross shape that are designed to actuate underlying contact points, and that the second part has a hole in the centre in which is arranged a shaft for a rotatable part of the switch and which forms the operating element of the switch device, and actuator for a centrally underlying contact point.

4.

A multifunctional switch device as disclosed in claim 1 or 2, characterised in

- that the mutually movable parts of the tilting device are made of a flexible material.

5.

A multifunctional switch device as disclosed in claim 1 or 2, characterised in

- that the two mutually movable parts of the tilting device are mounted on supporting points via shafts partly rotatable therein.

6.

A multifunctional switch device as disclosed in one or more of claims 1-5, characterised in

- that a centre portion which forms the rotatable part of the switch device and mount for an operating element has a plurality of vertical faces and grooves, against which springs attached to the frame of the switch device grip in order to effect stepwise rotation of the operating element. (Figs. 2c, 3b, 3d)

7.

A multifunctional switch device as disclosed in claim 6, characterised in

- that the stepwise rotation is detected by means of contact springs which tilt on contact with grooves in the rotary element, and form contact with and/or short circuit at associated contact points arranged on the frame of the switch device.

8.

A multifunctional switch device with a function for rotation and also tilt and/or press functions, intended for use in electronic equipment such as computers, handheld electronic apparatus and/or devices which are associated with use in means of transport such as vehicle, boats and aircraft, said equipment having or being connected to a display for function control, characterised in

- that the switch device has a central tilting device which consists of two mutually movable, cardan coupling-supported parts, wherein the first of the parts is mounted to a switch base at a first pair of supporting points; and
- that the second of the parts is supported on the first part at a second pair of supporting points which are offset 90° relative to the first pair. (Figs. 5-9)

9.

A multifunctional switch device as disclosed in claim 8, characterised in

- that the first part of the tilting device is fixedly attached to the second part via a second pair of supporting points, wherein the supporting points are flexible and torsional.

10.

A multifunctional switch device as disclosed in claim 8 or 9,
characterised in

- 5 - that the first part of the tilting device has a pair of projecting tilt pins for pivotal engagement with the first pair of supporting points.

11.

A multifunctional switch device as disclosed in claim 8, 9 or 10,
10 characterised in

- that the first part of the tilting device has a pair of supporting points which are fixedly attached to the base and a frame, wherein the supporting points are flexible and torsional. (Fig. 9)

15 12.

A multifunctional switch device as disclosed in one or more of claims 8-11,
characterised in

- that the second part of the tilting device has arms in a cross shape which are arranged to actuate underlying contact points; and
20 - that the second part has a hole in the centre through which there is provided a shaft for a rotatable part of the switch which forms the operating element of the switch device, and actuator for a centrally located contact point.

13.

25 A multifunctional switch device as disclosed in one or more of claims 8-12,
characterised in

- that a central midportion of the second part of the tilting device has a plurality of vertical faces; and
- that a spring is fastened to a rotatable part of the switch device which forms an
30 operating element, the spring gripping thereagainst in order to effect stepwise rotation of the rotating part.

14.

A multifunctional switch as disclosed in claim 13, characterised in

- 35 - that the spring is of the wire type and is in the form of a clip.

15.

A multifunctional switch device as disclosed in one or more of claims 8-13, characterised in

- that the switch device has a rotatable part which forms an operating element and which is pivotally supported in the tilting device, and having mounted thereon an annular slip ring for sensing against contact fields on said base for detection of the position of the operating element in relation to the base.

16.

A multifunctional switch device as disclosed in one or more of claims 8-13, characterised in

- that the base of the switch device has snap discs and contact fields for actuating switch functions; and
- that the base has mounted thereon an outer frame which has a ring of fields which the slip ring touches for contact and detection on rotation of the operating element.

17.

A multifunctional switch device as disclosed in one or more of claims 8-13, characterised in

- that the device has a frame part which contains contact fields for sensing rotation of the operating element. (Fig. 9)

18.

A multifunctional switch device as disclosed in one or more of claims 8-13, characterised in

- that central depression of the operating element is designed to cause collapse of the underlying snap disc on a central contact field, whilst pressure on an outer part of the operating element or tilting of the operating element is designed to provide a movement of the tilting device which causes collapse of one of the underlying outer snap discs on an associated contact field.

19.

A multifunctional switch device as disclosed in one or more of claims 1-18, characterised in

- that the operating element has an outer face, or is encased by a part made having an outer face which is smooth or has contours, dimples or structures for friction against a user's finger in the peripheral area; and
- that the outer face is concave in a central part where a tactile pin or depression is arranged in the centre. (Fig. 8)

20.

A multifunctional switch device as disclosed in one or more of claims 1-19, characterised in

- that the central tilting device forms the basis for switch functions for a switch device consisting of a stepwise rotatable operating element in the form of a disc which is designed on rotation to move a cursor, screen image or other screen-related functions, stepwise in a graphical user interface, and which is centrally depressible as well as tiltable in four directions in order to actuate switch functions associated with the switch device. (Fig. 4)

THIS PAGE BLANK (USPTO)